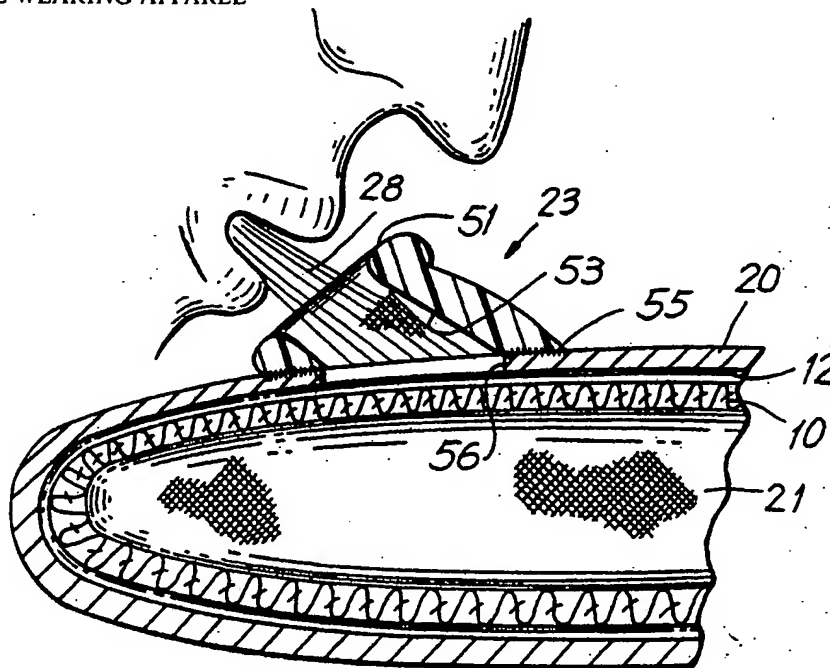




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁵ : A41D 19/00, 13/08, A61F 11/06	A1	(11) International Publication Number: WO 92/17079 (43) International Publication Date: 15 October 1992 (15.10.92)
(21) International Application Number: PCT/US92/03007 (22) International Filing Date: 8 April 1992 (08.04.92) (30) Priority data: 682,516 8 April 1991 (08.04.91) US (71)(72) Applicant and Inventor: KIMBROUGH, Richard [US/ US]; 622 1/2 B Canyon Road, Santa Fe, NM 87501 (US). (74) Agents: ROSENTHAL, Lawrence et al.; Blum Kaplan, 1120 Avenue of the Americas, New York, NY 10036 (US).	(81) Designated States: AT (European patent), BE (European patent), CA, CH (European patent), DE (European patent), DK (European patent), ES (European patent), FR (European patent), GB (European patent), GR (European patent), IT (European patent), JP, LU (European patent), MC (European patent), NL (European patent), SE (European patent). Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>	

(54) Title: HEATABLE WEARING APPAREL



(57) Abstract

An article of heatable wearing apparel for providing warmth to a body extremity of a user adapted to permit the insertion of heated air (28) into the article of wearing apparel is provided. A first outer layer (20) of material defining a cavity therein is provided adapted to substantially envelope at least portion of an extremity of the user. A conduit (23) is disposed in said first layer (20) of material for selectively permitting heated air to be inserted into the cavity, as by the breath of the user. A second inner layer (10) of material defining a space with the outer layer of material may be provided, in which case the heated air is applied to the space (12).

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HEATABLE WEARING APPAREL

BACKGROUND OF THE INVENTION

The present invention is directed generally to a piece of wearing apparel and, in particular, to a heatable article of wearing apparel particularly suited for use on a human's extremities that are particularly prone to the ill effects of cold weather.

One article of wearing apparel in which the instant invention is particularly well suited is a glove or mitten to be worn on the user's hands. In the past, a person requiring full unrestricted use of his hands in cold weather was required to wear a conventional pair of gloves, and a person requiring a lesser degree of maneuverability in the finger region was capable of wearing mittens, wherein the fingers are all enclosed together within the body of the glove, maintaining contact with one another, thereby maintaining greater warmth than a conventional glove. Further, a person requiring little or no maneuverability of the hands was capable of wearing a muff, wherein both hands are enclosed within a single garment thereby sharing body warmth and providing the greatest warmth to the user.

All the aforementioned articles of wearing apparel in their conventional form suffer from the same insufficiency in that They are incapable of adding external heat to the user's body extremities. Body extremities maintain warmth for the most part through the heart pumping warm blood carried through arteries and into the capillaries of the extremity. When a human body is subject to cold temperatures, and the extremities thereof are subject to equally cold temperature vaso constriction occurs. Specifically, the blood vessels of the extremity constrict, thereby reducing the flow of warm blood into the extremity and maintaining the internal blood temperature of the body. While the body and extremities are subject to this cold temperature, the extremity in particular will continue to lose body temperature unless external heat is supplied or circulation is increased by exercise. Thus, it would be advantageous if an article of wearing apparel were

capable of adding heat or accepting the addition of external heat.

In the past, attempts have been made to provide a product that adds external heat to articles of clothing for providing warmth to extremities. Such examples as battery operated socks and battery operated ski boots to add warmth to the feet are known, as well as chemically coated cloths that generate heat when exposed to oxygen are known. These devices all suffer from an elementary deficiency in that the external source of heat eventually terminates when the batteries wear out or the chemical reaction is completed. Further such constructions are relatively expensive.

Accordingly, it is desirable to provide an article of wearing apparel for warming a body extremity wherein an external source of heat may be applied which meets the criteria set forth above that the heat source never wears out, and to provide such a product that is convenient and inexpensive.

SUMMARY OF THE INVENTION

Generally speaking, in accordance with the invention, an article of heated wearing apparel adapted to permit the insertion of heated air within the article is provided. The article has a first layer of material for defining a cavity therein, and substantially enveloping at least a portion of an extremity of the user. The layer of material is selected to aid in retaining heated air therein. A conduit is formed disposed in the first layer of material for selectively permitting heated air, such as the breath of the user, to be blown into said cavity. A second layer substantially enveloping at least a part of the extremity is received within the first layer to permit the heated air to be received therebetween. The second layer is selected to permit transfer of heat to the extremity from the air.

The conduit may be integrally formed with a mounting surface to be secured upon the exterior of the first layer of material. The mounting surface may be designed to receive ornamental material or material shaped in an ornamental configuration such as all or a part of a character figure.

The entire conduit may be formed in the shape of a character. On such an embodiment, the nose or mouth of the character would define an aperture leading to the conduit wherein the heated air is injected into the cavity. An insulating and conducting member may be provided in the conduit to aid in retaining heated air while permitting air under pressure therethrough.

Accordingly, it is an object of this invention to provide an improved article of heatable wearing apparel.

Another object of this invention is to provide an article of heatable wearing apparel that does not unnecessarily inhibit the users use of the extremity covered.

A further object of this invention is to provide an article of heatable wearing apparel that never runs out of thermal heating energy.

Yet another object of this invention is to provide an article of heatable wearing apparel that encourages the user to wear the article through enhanced play value.

Still other objects and advantages of the invention will in part be obvious and will in part be apparent from the specification.

The invention accordingly comprises the several steps and the relation of one or more of such steps with respect to each of the others thereof, which will be exemplified in the method hereinafter disclosed, and the scope of the invention will be indicated in the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

For a fuller understanding of the invention, reference is had to the following description taken in connection with the accompanying drawings, in which:

FIG. 1 is a perspective view of a first embodiment of the invention in use;

FIG. 2 is a top plan view of the first embodiment of the invention;

FIG. 3 is a sectional view taken along line 3-3 of FIG. 2;

FIG. 4 is a top plan view of a second embodiment of the current invention;

FIG. 5 is an enlarged fragmentary sectional view taken along line 5-5 of FIG. 4, showing the user blowing air therein;

FIG. 6 is a top plan view of a third embodiment of the invention;

FIG. 7 is a perspective view of a fourth embodiment of the current invention showing the users hands in phantom;

FIG. 8 is a fragmentary sectional view taken along line 8-8 of FIG. 7;

FIG. 9 is a fragmentary sectional view of a one-layer embodiment of the invention;

FIG. 10 is a perspective view of a fifth embodiment of the current invention;

FIG. 11 is a sectional view taken along line 11-11 of FIG. 10;

FIG. 12 is a perspective view of a sixth embodiment of the invention in use;

FIG. 13 is a perspective view of a seventh embodiment of the invention in use with air flow shown in phantom; and

FIG. 14 is a fragmentary sectional view taken along line 14-14 of FIG. 13.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Reference is first made to FIGS. 1-3, wherein an article of heatable wearing apparel, generally indicated as 15, in accordance with the invention, is depicted in use. In this first embodiment the article is a mitten. The apparatus includes a first outer layer of material 20 configured of leather, suede, denim, GORE-TEX manufactured by W.L. Gore & Associates, or the like for providing a barrier between the outside environment and the user's body extremity. Inside the first layer is a second inner layer of material 10 which can define a space at the interface 12 between the first and second layers. The second layer of material 10 defines a cavity 21 wherein the user's body extremity is substantially enveloped. The article is further provided with an air conduit, generally

indicated at 22, connecting the outside environment and the space between the first and second layers of material 20.

The air conduit 22 is formed with a mouthpiece 24 having a passage 45 therethrough that the user exhales heated air into, thereby transmitting a column of warm air through conduit passage 45 and into interface 12 defined by the first layer of material 20 and second layer of material 10.

Second inner layer 10 is selected to permit the passage of heat and heated air therethrough to warm the fingers of the user in cavity 21. Applicant has found that the passage of the air through space 12 generates greater heat than can be expected from the heated breath and it is believed that additional useful heat is being generated by frictional heating of air as it passes second layer 10, although the precise cause of this increased and unexpected heating effect is not known.

Conduit 15 includes a substantially circular mounting platform 40 formed integrally with mouthpiece 24, although provision of such a platform is not required. Mounting platform 40 has an outer flat side 41 designed to receive an aesthetically pleasing or promotional design or label thereon, thereby providing enhanced play value or utility. The label can refer to a character, sport's team, trademark or just be aesthetic. The mouthpiece is strategically placed within platform 40 as desired.

Reference is next made to FIGS. 4 and 5, wherein a mitten 15a is depicted. The conduit, generally indicated as 23 is depicted shaped as an animal nose, in this case a pig. Conduit 23 has a portion 51 provided as a mouthpiece, but no platform. A pair of openings 53 are provided for the entry of air 28 blown by the user. A base portion 55 is securely affixed to the first layer of material 20, like reference numerals being used for like objects as in FIGS. 1-3. An aperture 56 is cut in the first material layer 20 to permit air to pass into space 12 and into cavity 21. The conduit 23 is secured to the second layer of material 20 by adhesive or the like.

Reference is now made to FIG. 6 wherein the mitten 15b has a conduit generally indicated as 24 that is aesthetically designed to have the three dimensional shape of a face, but functions in a fashion similar to that of FIGS. 1-5, like reference numerals being applied to like elements. The face is designed with a nose having apertures 63 to define a mouthpiece, the apertures running from the mouthpiece through to the space 21 inside the mitten. The conduit is securely affixed to the first material layer.

The second layer of material 10 is configured as a loose knit, fleece, goose down, THINSULATE manufactured by the 3M Company of Minneapolis St. Paul or the like such that it is capable of passing the heat to the user's extremity. The column of air forced through the conduit by the pressure from the user's breath is dispersed along the second layer of material 10, thus the users hand, or at least the portion positioned in the vicinity of the mouthpiece, is substantially enveloped in a warm soft fabric. The warm air that flows through the second layer of material 10 is substantially dissipated. Alternatively, when there is not substantial air pressure exerted through the interface the inner lining acts to insulate the cavity from the external air. Thus, it allows warm air and/or heat into cavity 21, and forms a heated surrounding surface. Furthermore, when heated air is not inserted through mouthpiece 42 the pressure outside the glove equals the pressure inside the cavity and the insulating layer 10 insulates the cavity 21 from the cold outside environment.

Conduits 22, 23 and 24 may be mounted on the outside surface of said first layer of material 20 through any process such as adhesion by an adhesive, stitching, or a velcro type adhesion such that the aesthetic conduit can be replaced and the play value can be enhanced.

Reference is next made to FIGS. 7 and 8, wherein a muff is depicted generally indicated as 70. The muff is depicted in use with the hands of the user shown in phantom. The muff is provided with a first outer layer of material 71, and a conduit generally indicated as 72. Conduit 72 is

provided with a first portion 73 provided as a mouthpiece and a base portion 75. The continuous inner wall 76 of mouthpiece 72 forms a passage for directing a column of air from the entrance of the mouthpiece 73 into a space 77 defined between inner material 78 and outer material 71.

The base portion 75 is provided to fit between the first layer of material 71 and the second layer of material 78 and to extend beyond the hole in outer material 71 through which mouthpiece 73 extends. In this embodiment the base portion 75 of interface 72 is not visible, yet it serves to hold the conduit in position thus, providing a more aesthetically pleasing product for an adult user.

Reference is next made to FIG. 9, wherein a cross-sectional view of still another embodiment is depicted. This embodiment uses only a one-layer product design. The outer layer of material 90 would preferably be configured as a substantially moisture impermeable layer with thermal insulating capability. The conduit shown generally at 100 is provided with a mouthpiece portion 91 and a base portion 93. The top end of mouthpiece 91 receives a plug 95. The plug 95 is joined to the mouthpiece by a living hinge 96 mounted to the top portion of the mouthpiece 92. The plug may be provided, as disclosed in FIG. 9 with a snap fit to lock it into place, or may be supplied with a screw on thread, in which case the living hinge would have to be left off.

The passage 92 in mouthpiece 91 is provided with a filter 99 provided to filter out the moisture in the column of air. The filter can be formed of any of the materials that the second layer of material 10 is constructed of. This filter need only serve the purpose of allowing air to pass through while removing a degree of the moisture to maintain a comfortable environment within the cavity defined by the first layer of material 90.

Reference is next made to FIGS. 10 and 11, wherein a heated glove 100 is depicted. Glove 100 is constructed of a first layer of material 101a, and a second layer of material 101b within the first layer and space 116 is defined

therebetween. The glove is configured to receive the hand of a user and selectively receive each finger in its own cavity. Conduit assembly 105 is provided to disperse heated air to each finger.

Conduit assembly 105 is provided with mouthpiece 106 having a passage 108 acting as a conduit for transmitting a column of heated air into the body 110 of the conduit assembly. The body 110 is located between the first layer of material 100 and the second layer of material 101 and serves as a manifold. The body 110 is further constructed with a top wall 111, a bottom wall 112 and side walls 113. A column of air travels in through mouthpiece 106 and through passage 108 into body chamber 115. The air is then transported out by pressure through outlet tubes 120. Outlet tubes 120 are provided extending from openings in side walls 113 and terminating within the finger chambers 102. Thus the warm air received in the body chamber is channeled through conduits 120 and terminates in the finger chambers 102, thereby warming the fingers.

Referring to FIG. 12 a heated pair of ear muffs 130 in accordance with a sixth embodiment of the invention is depicted. The first layer of material 121 is depicted substantially enveloping the ears of the user. The user is further depicted exhaling into mouthpiece 124 at the end of tube 128 thereby transmitting a column of warm air to a space (not shown) as in the other embodiments.

Referring to FIGS. 13 and 14, a heatable glove, generally indicated at 140 is depicted in accordance with a seventh embodiment of the invention. The glove is depicted with a first layer of material 142 substantially enveloping the hand of the user. Material 142 is constructed of a substantially air or wind impermeable material, such as, leather or suede. First layer 142 terminates at wrist band 144 constructed to be resilient to closely engage the wrist of the user to aid in retaining heated air within the glove.

The glove is configured to receive the hand of the user through opening 146 defined by wrist band 144. The body

of the users hand is received in cavity 156 and each finger is selectively received in its own cavity 156a through 156e in the finger regions of the glove.

Conduit assembly 150 is provided with a mouthpiece 152 having a passage 154 acting as a conduit for transmitting a column of heated air into cavity 156 of the glove. The heated air is transmitted into cavity 156 and into individual finger cavities 156a-e and the cold air previously in the glove is ejected through wrist band 144.

Referring specifically to FIG. 14, a valve 160 is located within conduit 154 and is designed to permit warm air to flow into cavity 156 of the glove when the user exhales into mouthpiece 152. Alternatively, when no pressure is exerted valve 160 closes, thus preventing cool air from the outside from entering cavity 156. Valve 160 is integrally formed with conduit 154. The valve is constructed as a deformable rib that is selectively connected to the inner wall of the conduit. Rib 162 blocks the flow of air through conduit 154 unless pressurized air is exerted against it, thereby deforming it and allowing the air to pass therethrough as is depicted in FIG. 14.

This invention may be constructed to be incorporated into a wide array of different embodiments. Further embodiments that may be constructed are mitten type puppets, scarf mittens containing toy type designs for children, and soft animal muff combinations having enhanced play value for children. Thus, configurations having enhanced play value for children are virtually limitless.

It will thus be seen that the objects set forth above among those made apparent from the preceding description, are efficiently attained and, since certain changes may be made in the above article without departing from the spirit and scope of the invention, it is intended that all matter contained in the above description and shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

CLAIMS

WHAT IS CLAIMED IS:

1. An article of wearing apparel comprising a first layer of material defining a cavity therein, said cavity substantially enveloping at least a portion of an extremity of the user, said conduit means being adapted to define a passage through said layer of material and further defining a mouthpiece permitting a user to apply heated air into said cavity.
2. The article of wearing apparel of claim 1, and including valve means inside said conduit means.
3. The article of wearing apparel of claim 1, and including moisture filter inside said conduit means adapted to permit the passage of the heated air therethrough.
4. The article of wearing apparel of claim 1, wherein said first layer of material is adapted to essentially limit the passage of air therethrough except in the region of said conduit means.
5. The article of wearing apparel of claim 4, and including an elastic fabric region for engagement with the body of the user to restrict the flow of heated air from the cavity defined by said first layer of material.
6. The article of wearing apparel of claim 1, and including an elastic fabric region for engagement with the body of the user to restrict the flow of heated air from the cavity defined by said first layer of material.
7. The article of wearing material of claim 4, wherein the first layer of material is leather.
8. The article of wearing apparel of claim 4, wherein the first layer of material is formed of a synthetic fabric.
9. The article of wearing apparel of claim 1, and including a second inner layer of material within said cavity and adapted to substantially envelope at least a portion of said extremity, said first and second layers of material defining a space therebetween at least in the region of said conduit means for receiving said heated air, said second layer

of material being adapted to transmit the heat from said heated air to said extremity.

10. The article of wearing apparel of claim 9, where said second layer inner is heated by the passage of said heated air therepassed.

11. The article of wearing apparel of claim 9, wherein said second layer of material is a thermal insulator.

12. The article of wearing apparel of claim 1, and including a cap means coupled for releasably closing said conduit means.

13. The article of wearing apparel of claim 12, wherein caps means is coupled to said conduit means to remain attached thereto even when in an open position.

14. The article of wearing apparel of claim 1, wherein said conduit means is coupled to a mounting means for securing to said first layer of material.

15. The article of wearing apparel of claim 14, wherein said mounting means is mounted on the inside of said first layer of material.

16. The article of wearing apparel of claim 14, wherein said mounting means is mounted at least in part on the exterior surface of said first layer of material.

17. The article of wearing apparel of claim 16, wherein said conduit means and mounting means are shaped to define a recognizable object.

18. The article of wearing apparel of claim 17, wherein said object is at least a part of a human, humanoid or animal character.

19. The article of wearing apparel of claim 18, wherein said conduit means defines a natural orifice of said character.

20. The article of wearing apparel of claim 19, wherein said conduit means at least in part defines the appearance of a nose.

21. The article of wearing apparel of claim 19, wherein said conduit means at least in part defines the appearance of a mouth.

22. The article wearing apparel of claim 16, wherein said mounting means defines a surface having a design.

23. The article of wearing apparel of claim 16, wherein the mounting means is adapted to receive a design.

24. The article of wearing apparel of claim 1, wherein said article is a mitten.

25. The article of wearing apparel of claim 1, wherein said article is a glove.

26. The article of wearing apparel of claim 1, wherein said article is a muff.

27. The article of wearing apparel of claim 1, wherein said article is an ear muff.

28. The article of wearing apparel of claim 25, wherein said conduit means is positioned in a non-finger region of said glove, and including means for directing said heated air from conduit means to the finger regions interior of said first layer of material.

29. The article of wearing apparel of claim 9, wherein said conduit means is coupled to a mounting means for securing to at least one of said first and second layers of material.

30. The article of wearing apparel of claim 29, wherein said mounting means is mounted intermediate of said first and second layers of material.

31. The article of wearing apparel of claim 29, wherein said mounting means is mounted at least in part on the exterior surface of said first layer of material.

32. The article of wearing apparel of claim 31, wherein said conduit means and mounting means are shaped to define a recognizable object.

33. The article of wearing apparel of claim 32, wherein said object is at least a part of a human, humanoid or animal character.

34. The article of wearing apparel of claim 33, wherein said conduit means defines a natural orifice of said character.

35. The article of wearing apparel of claim 34, wherein said conduit means at least in part defines the appearance of a nose.

36. The article wearing apparel of claim 34, wherein said conduit means at least in part defines the appearance of a mouth.

37. The article of wearing apparel of claim 31, wherein said mounting means defines a surface having a design.

38. The article of wearing apparel of claim 31, wherein the mounting means is adapted to receive a design.

39. The article of wearing apparel of claim 9, wherein said article is a mitten.

40. The article of wearing apparel of claim 9, wherein said article is a glove.

41. The article of wearing apparel of claim 9, wherein said article is a muff.

42. The article of wearing apparel of claim 9, wherein said article is an ear muff.

43. The article of wearing apparel of claim 40, wherein said conduit means is positioned in a non-finger region of said glove, and including means intermediate said first and second layers of material for directing said heated air from conduit means to the space between said first and second layers of material in the finger regions of said glove.

44. The article of wearing apparel of claim 9, wherein said first layer of material is adapted to essentially limit the passage of air therethrough except in the region of said conduit means.

45. The article of wearing material of claim 44, wherein the first layer of material is leather.

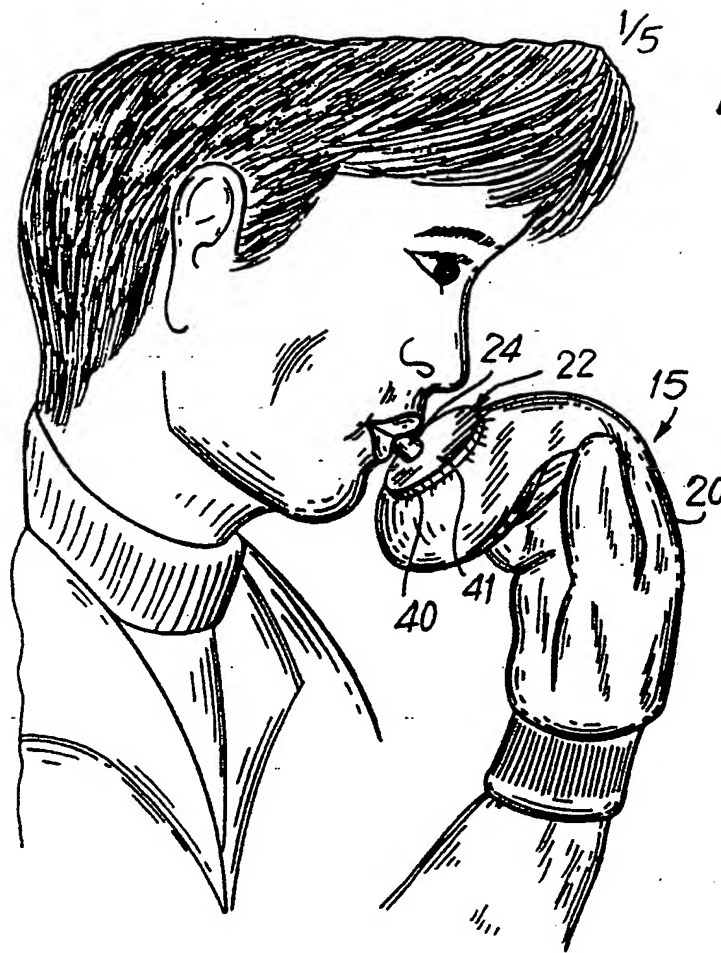


FIG. 1

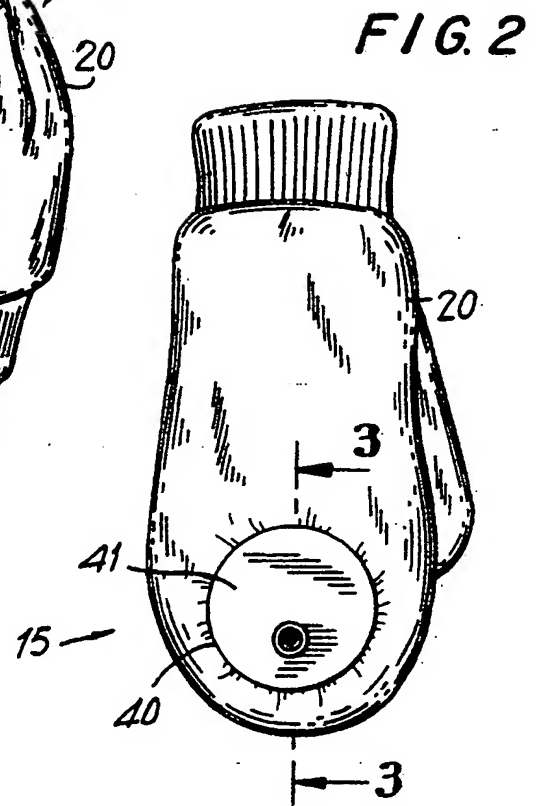


FIG. 2

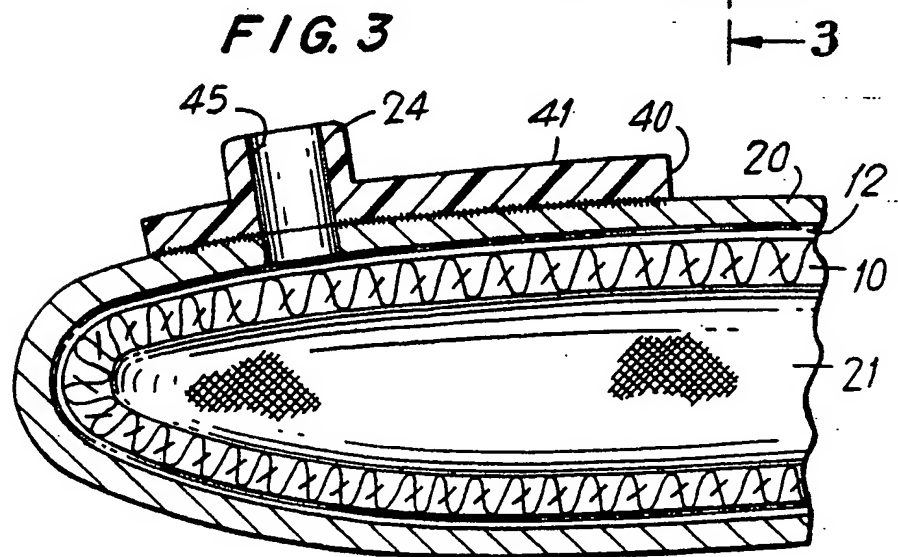


FIG. 3

FIG. 4 2/5

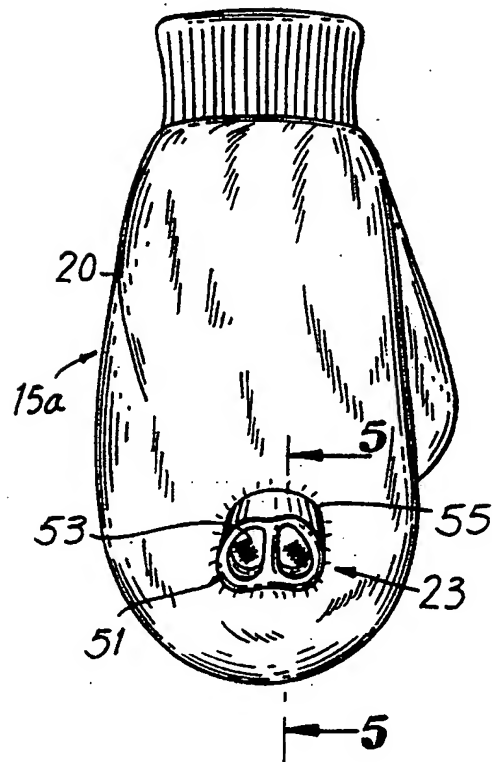


FIG. 6

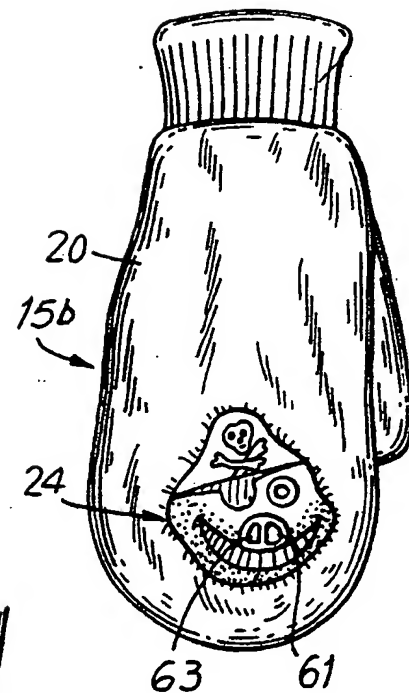
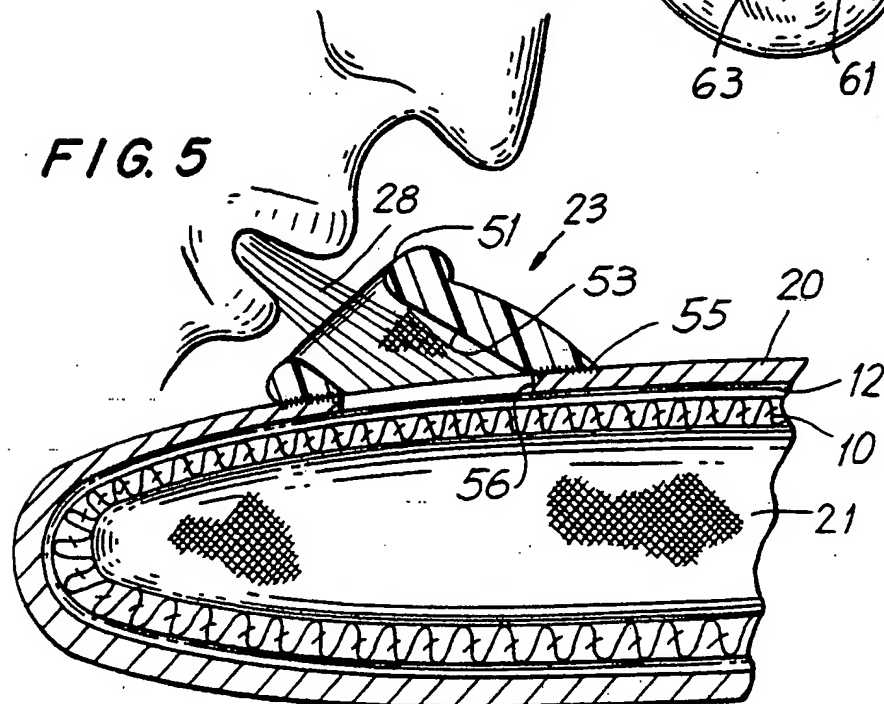
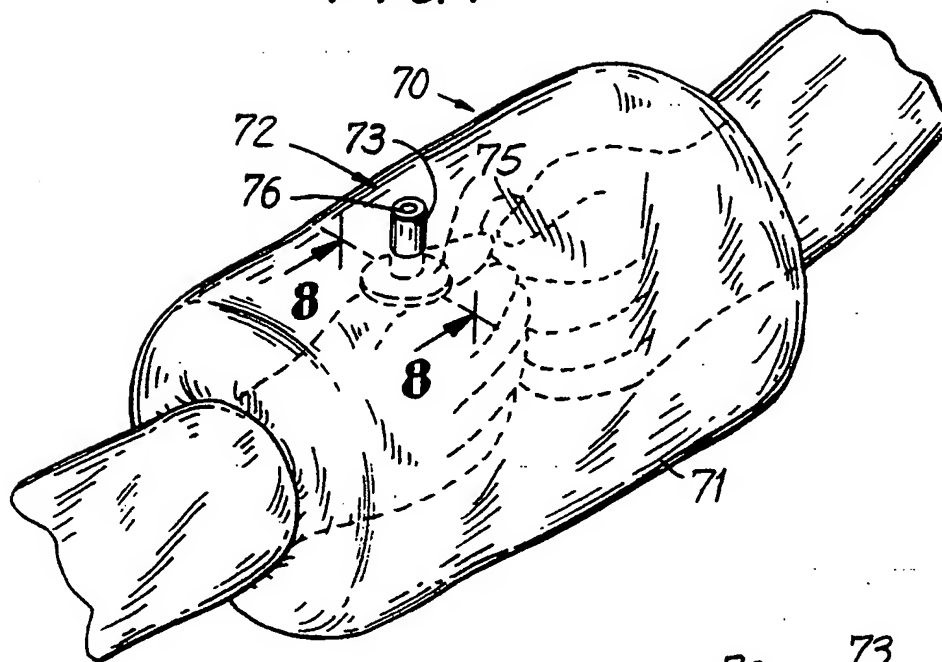
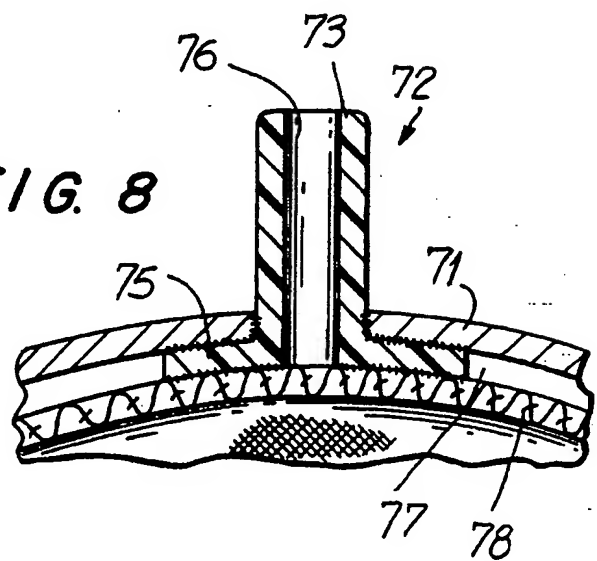
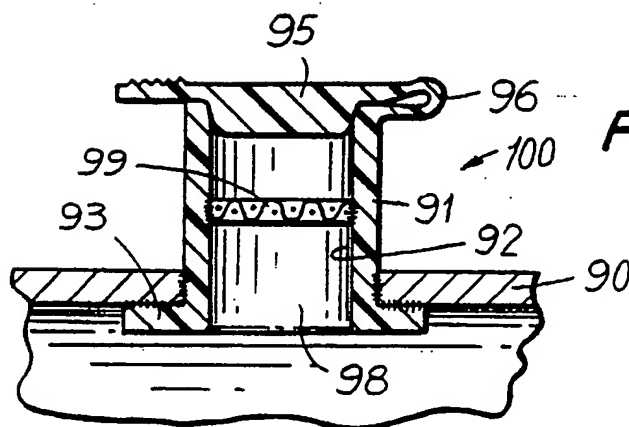


FIG. 5



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FIG. 7**FIG. 8****FIG. 9**

4/5 **FIG. 10**

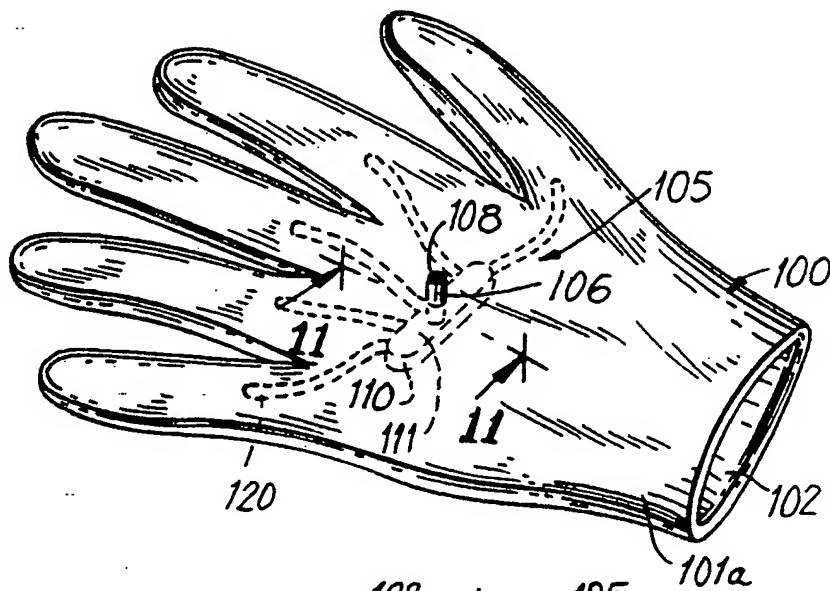


FIG. 11

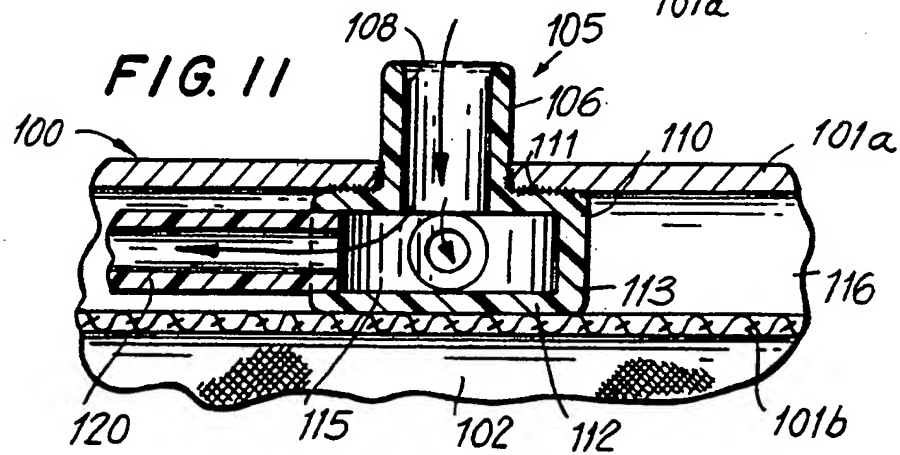
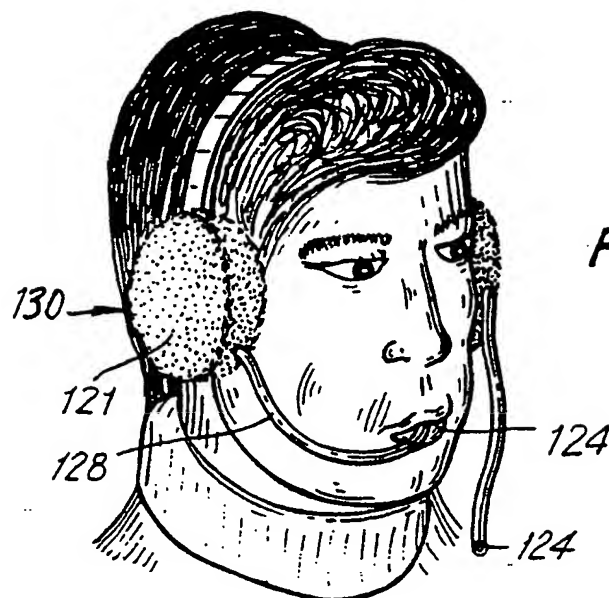


FIG. 12



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FIG. 13

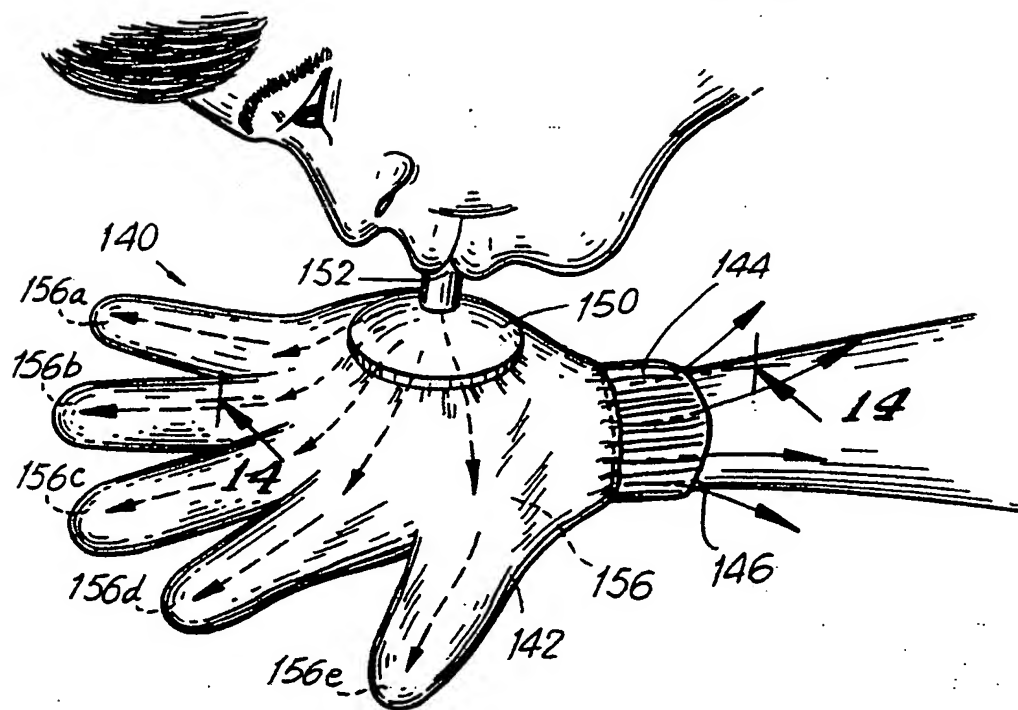
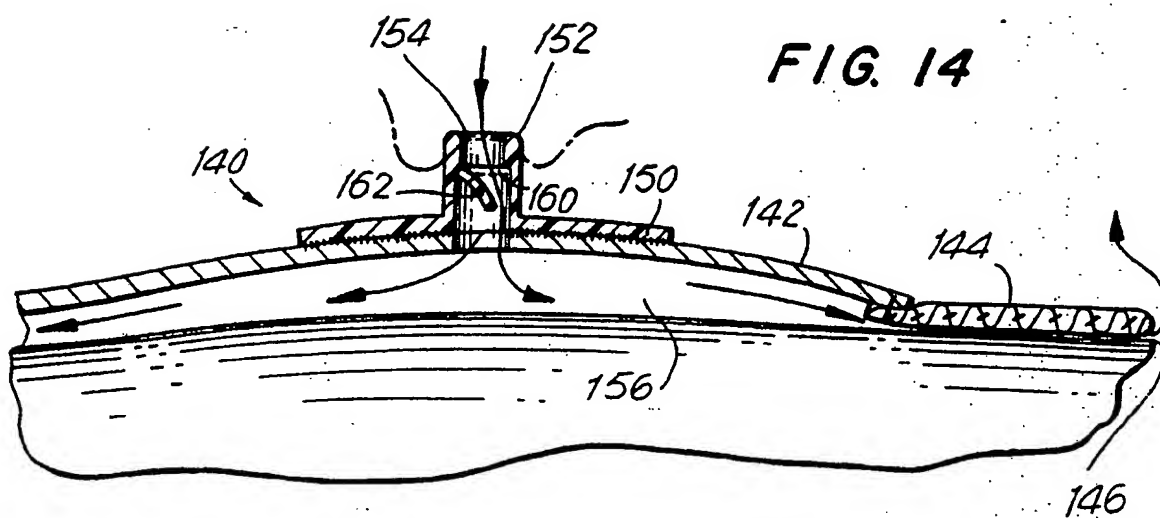


FIG. 14



INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 92/03007

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC		
Int.Cl. 5 A41D19/00; A41D13/08; A61F11/06		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
Int.Cl. 5	A41D ; A61F	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹		
Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	FR,A,2 124 257 (B. MOLINARI) 22 September 1972 see the whole document ---	1,9-11, 25,30 40,43-45
X	DE,C,942 208 (C. F. OBERMEYER) 26 April 1956 see the whole document ---	1,2,9,25 40,43
X	FR,A,2 089 036 (WALK-ON CORPORATION) 7 January 1972 see the whole document ---	1,4-6 24,25,28
A	EP,A,0 419 392 (RAYMOND DOUGLAS W.) 27 March 1991 see column 3, line 11 - column 5, line 13; figures 1-5 ---	1,4,12, 14 15,25
A	CA,A,1 260 201 (G. PLOUFFE) 26 September 1989 see the whole document ---	1,5,6 25
-/-		
<p>¹⁰ Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"d" document member of the same patent family</p>		
IV. CERTIFICATION		
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III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	US,A,4 547 906 (TAKESHI NISHIDA) 22 October 1985 see column 3, line 60 - column 4, line 43; figures 1-6 ---	1,3,9
A	FR,A,2 282 847 (LAZANAS A.) 26 March 1976 see page 3, line 4 - page 6, line 7; figures 1-9 ---	1,2

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. US 9203007
SA 59430**

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR-A-2124257	22-09-72	CH-A- 533962	28-02-73
DE-C-942208		None	
FR-A-2089036	07-01-72	AT-A, B 312538	15-12-73
		CA-A- 949251	18-06-74
		CH-A- 537162	13-07-73
		DE-A- 2115452	21-10-71
		GB-A- 1298180	29-11-72
		US-A- 3649966	21-03-72
EP-A-0419392	27-03-91	US-A- 5025502	25-06-91
		AU-A- 6258690	21-03-91
		CA-A- 2024364	19-03-91
		JP-A- 3295571	26-12-91
CA-A-1260201	26-09-89	None	
US-A-4547906	22-10-85	None	
FR-A-2282847	26-03-76	None	

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